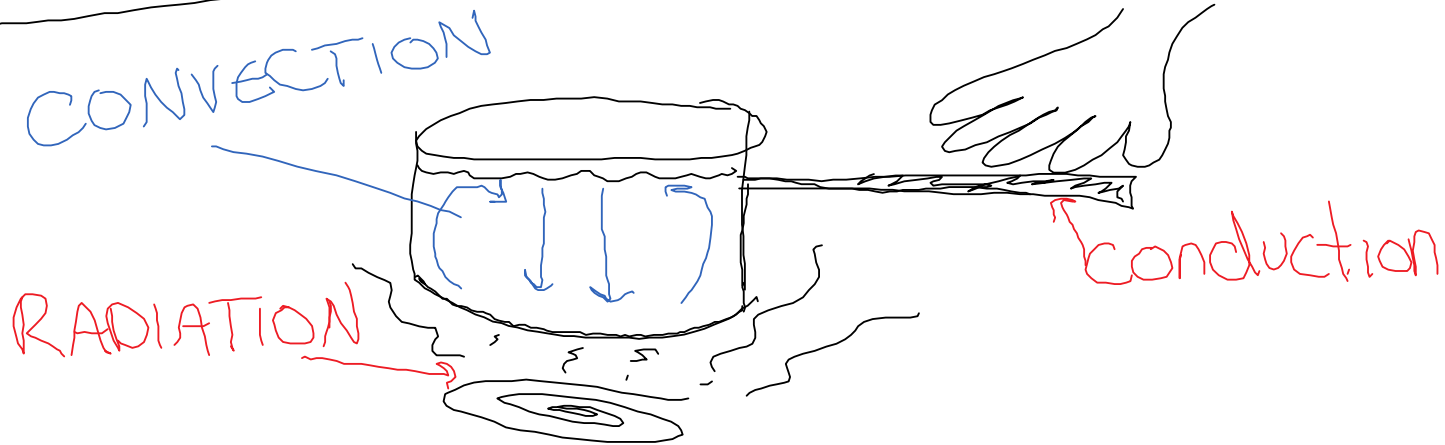


Heat Transfer



Conduction

- Transfer of kinetic energy through collisions of particles
- Objects must be touching

Convection

- Areas of liquid get warmer and less dense, rise to cooler areas
- Cooler liquid falls to take its place
- CIRCULATION transfers heat energy

Radiation

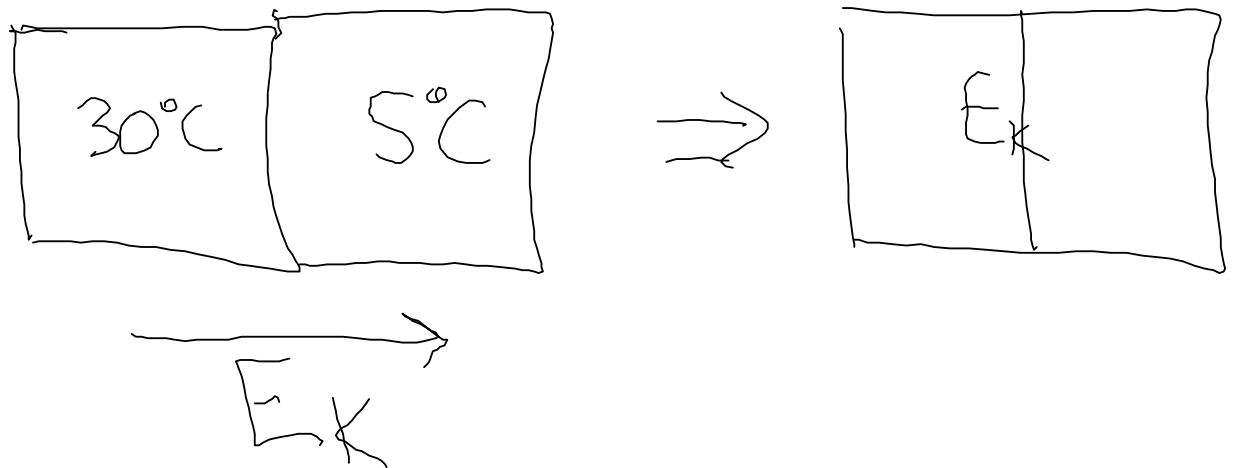
- Thermal energy becomes electromagnetic

energy

- Energy transport consisting of electromagnetic waves traveling at the speed of light

Convection and conduction depend on the presence of matter

thermal equilibrium



Thermal equilibrium

- The condition under which 2 substances in physical contact exchange no heat energy (i.e. are the same temperature)

Thermometer

- Measures temperature
- In contact with object, comes to thermal equilibrium
- Kelvin = Celsius + 273.15
- 0K = absolute zero (all thermal energy removed, no motion of particles)

Specific heat (c)

- Amount of energy that must be added to raise the temperature of a unit mass one temperature unit
- J / kg K, J/g C
- $Q = mc\Delta T$
- Example: Gold has a specific heat capacity of 0.128 J/gC. How many joules of heat energy are required to raise the temperature of 15 grams of gold from 22 to 85 degrees Celsius.

$$\begin{aligned}
 Q &= mc\Delta T \\
 &= (15g)(0.128 \frac{J}{g^{\circ}C})(63^{\circ}C) \\
 Q &= 120J
 \end{aligned}$$